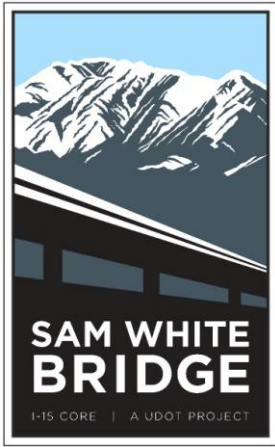


# I-15 CORE Design-Builder Perspective Provo River Constructors (PRC) Proctor Lane

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Jeff Dobmeier, P.E.; Structures Designer



# Advantages of Design-Build

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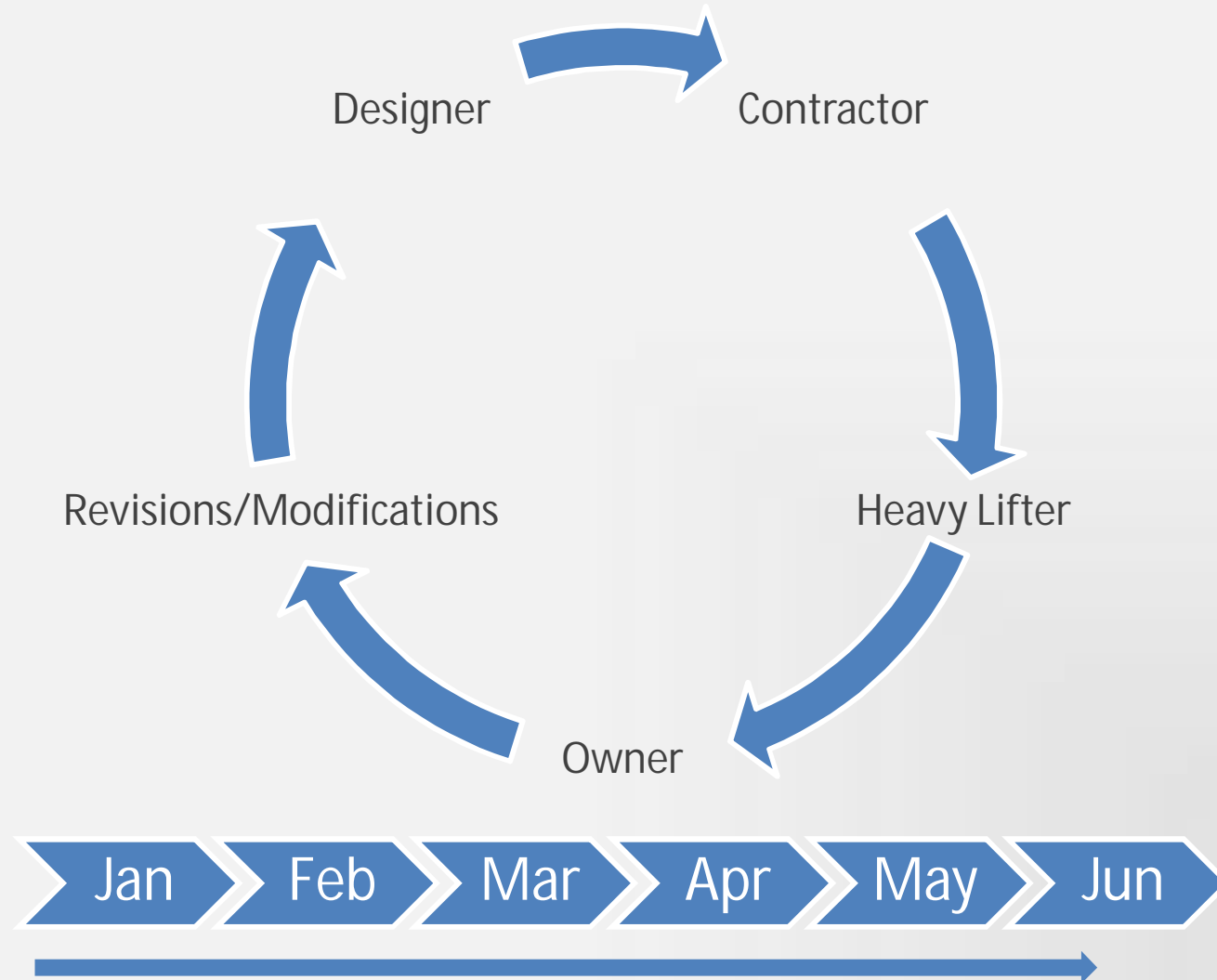
## SPMT projects

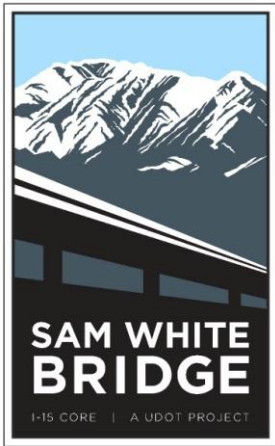
- Reduces or eliminates design assumptions
- Improves or permits optimization
- Increases adaptability
- Offers advantages without schedule delays
- Offers an accelerated schedule



# Traditional Design-Bid-Build

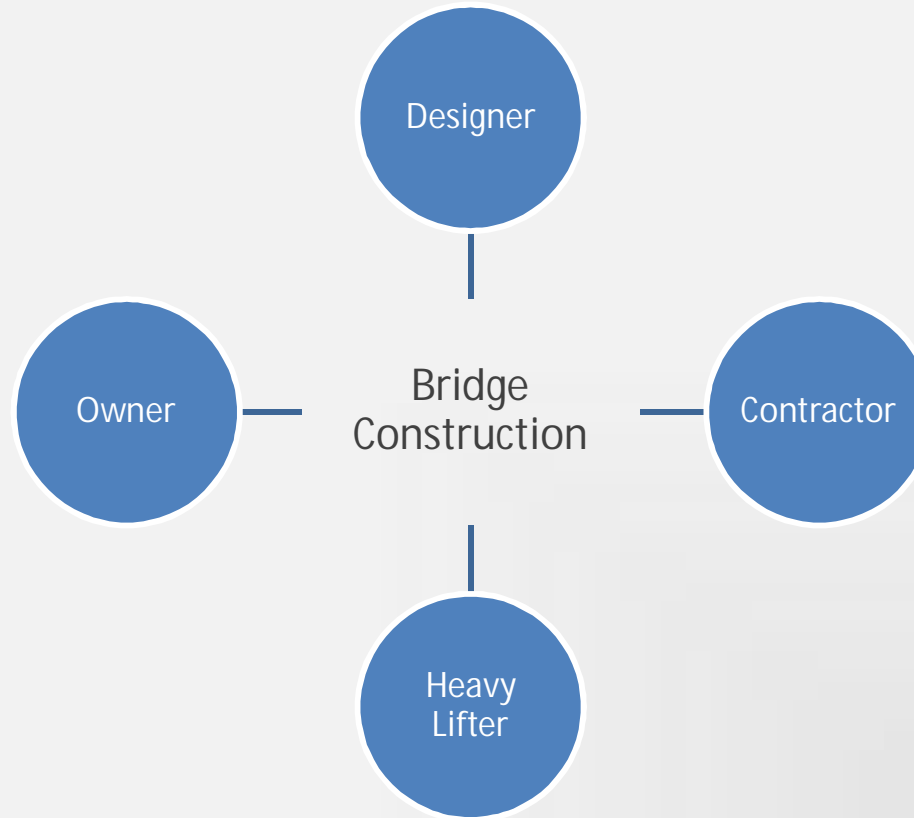
Traditional design-bid-build presents a very linear process

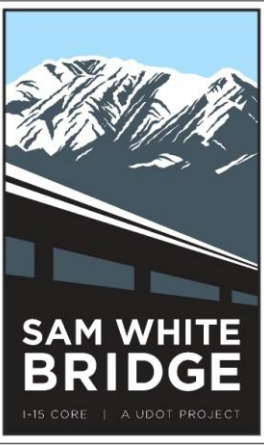




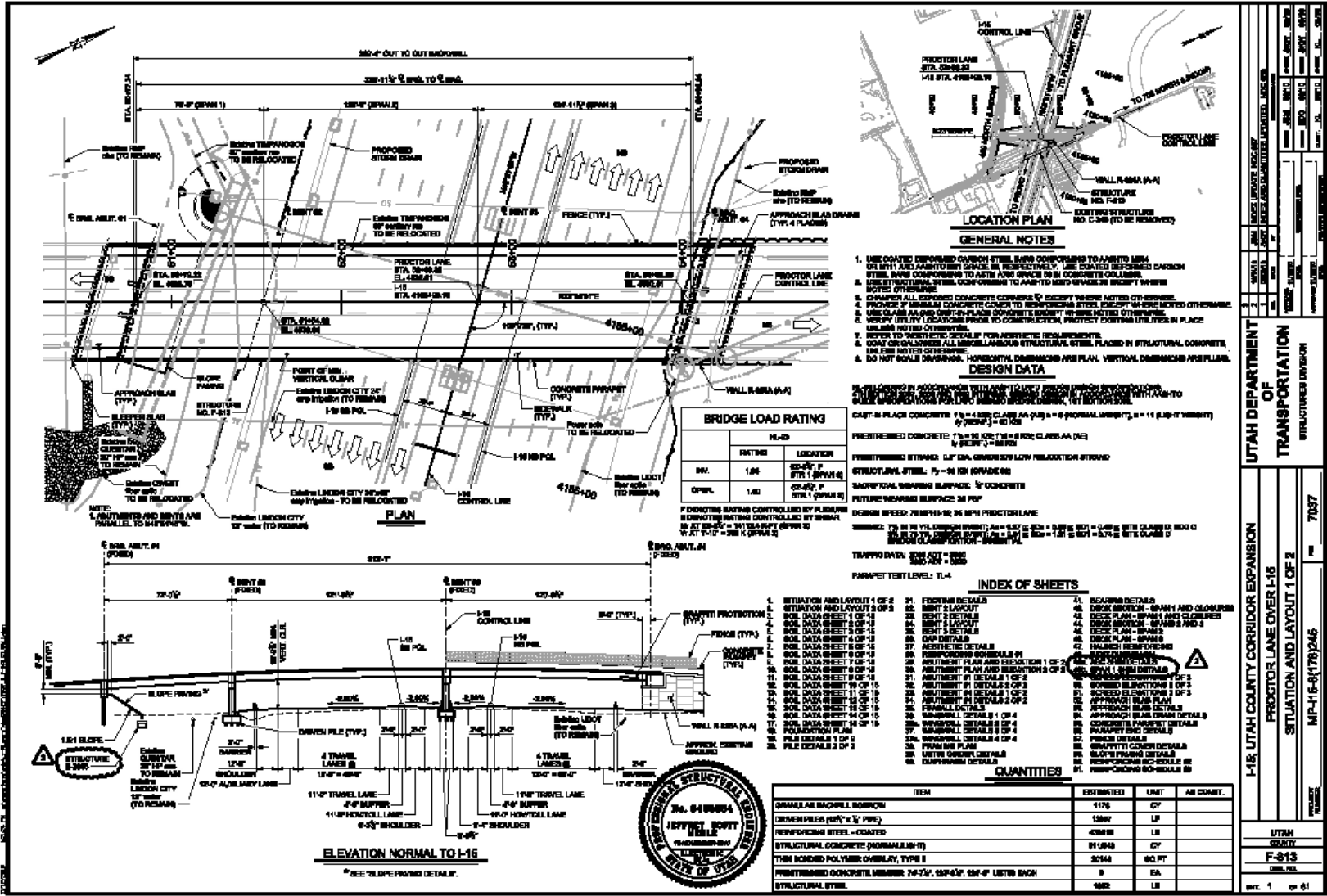
# Design-Build

Design-build presents more opportunities for parallel activities





# Proctor Lane Bridge

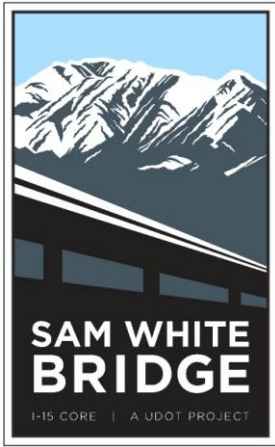


UTAH DEPARTMENT OF TRANSPORTATION  
STRUCTURES DIVISION  
PROJECT NUMBER: 7037  
MP-15-1(17)246

I-15, UTAH COUNTY CORRIDOR EXPANSION  
PROCTOR LANE OVER I-15  
SITUATION AND LAYOUT 1 OF 2  
DATE: 11/15/2014  
BY: J. H. HARRIS

UTAH COUNTY  
F-813  
DATE: 11/15/2014  
BY: J. H. HARRIS

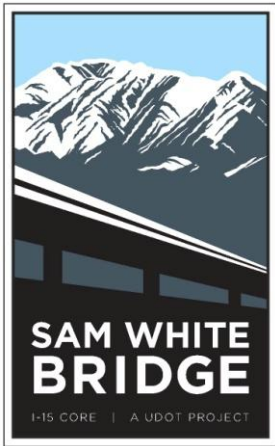
1 OF 2



# Increased Adaptability

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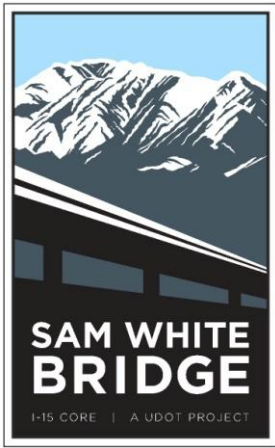
- Addressing camber variances
  - Geometry; deep haunches
  - Design; approximately 9 inches of build up at mid-span
  - Girders; predicted cambers unrealized
  - Haunch depths; in excess of 11.5 inches



# Camber Discussion

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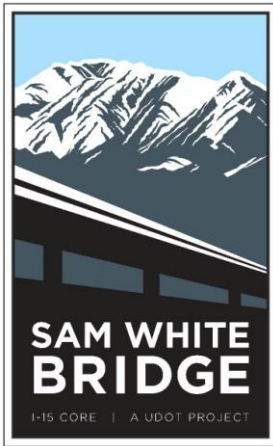




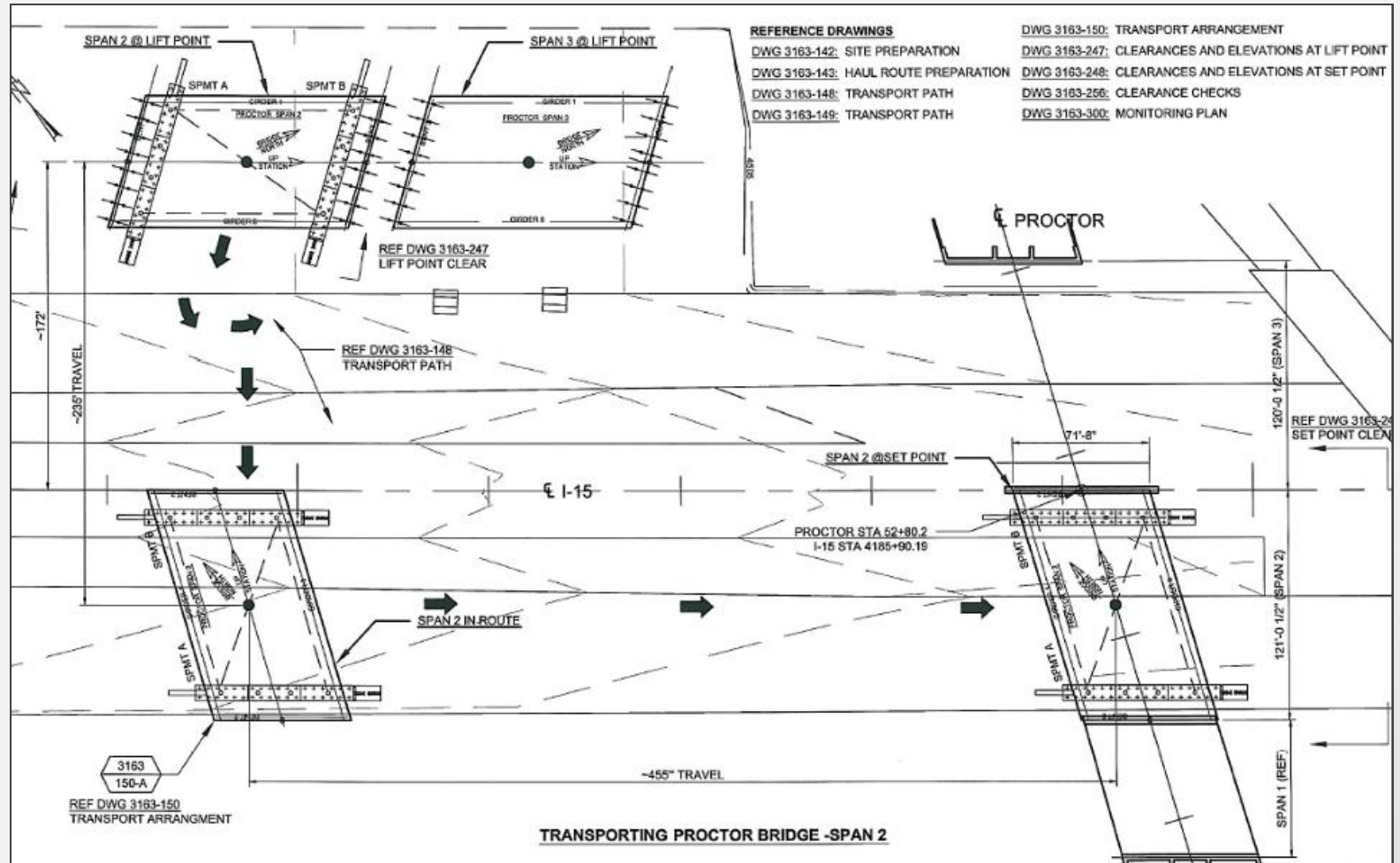
# Movability

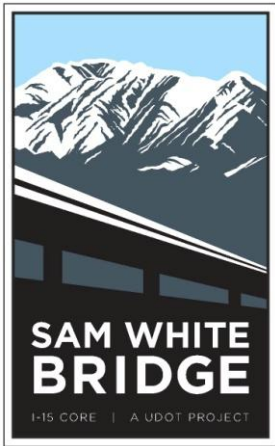
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# Movability

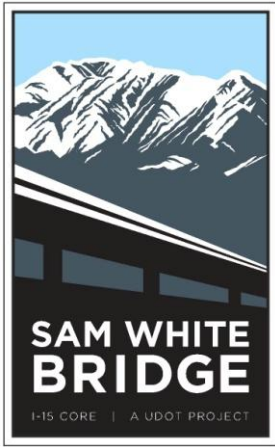




# Movability

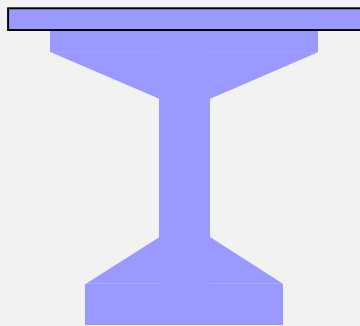
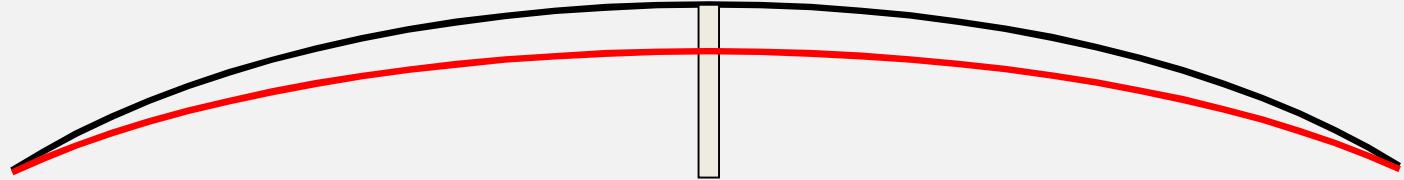
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# Camber Discussion

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Stresses after  
deck pour

+

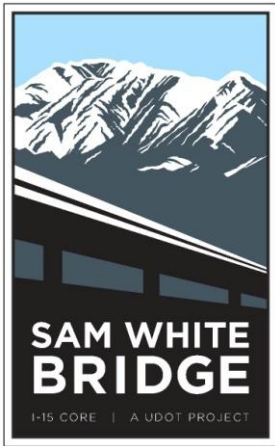


Incremental  
Stresses from  
shoring removal

=

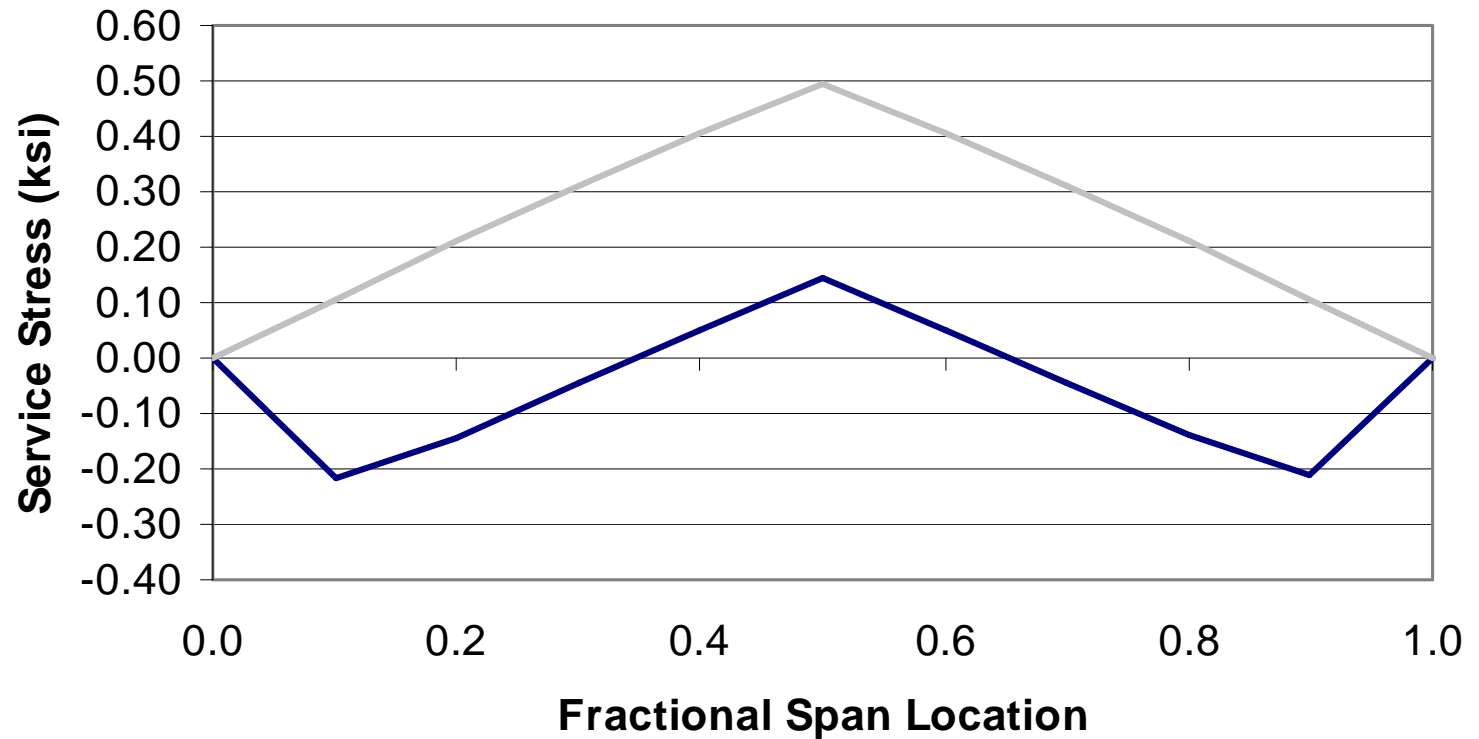


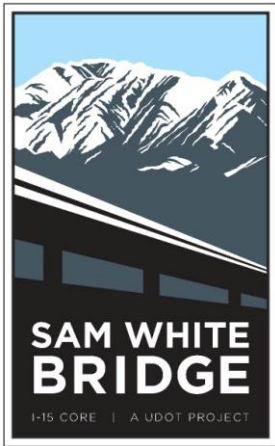
Stresses after  
shoring  
removal



# Stress Discussion

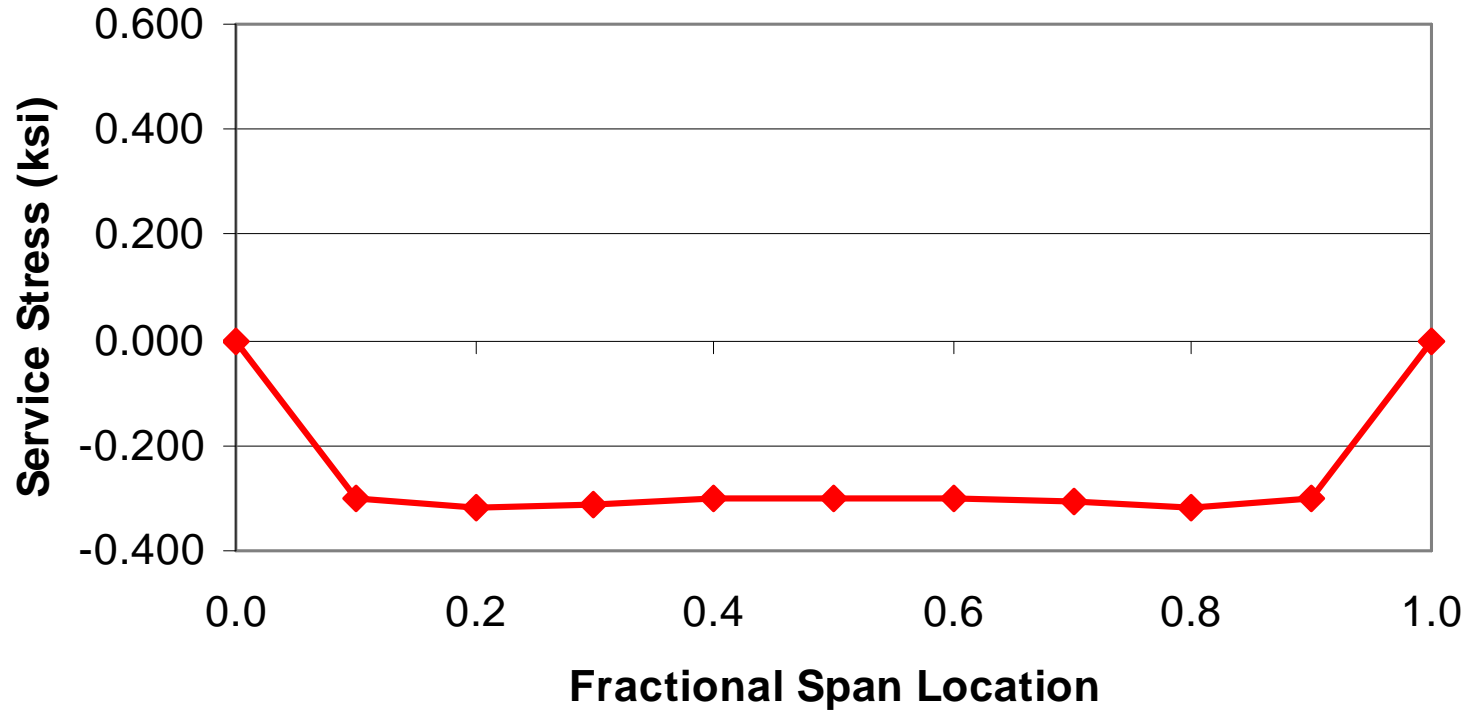
**Top of Deck Stresses - Midspan Shored  
SPMT Lift**

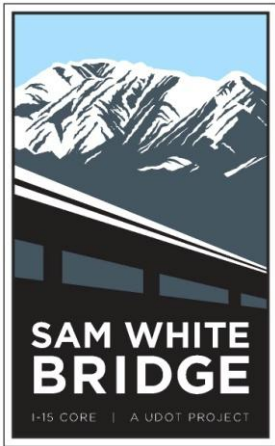




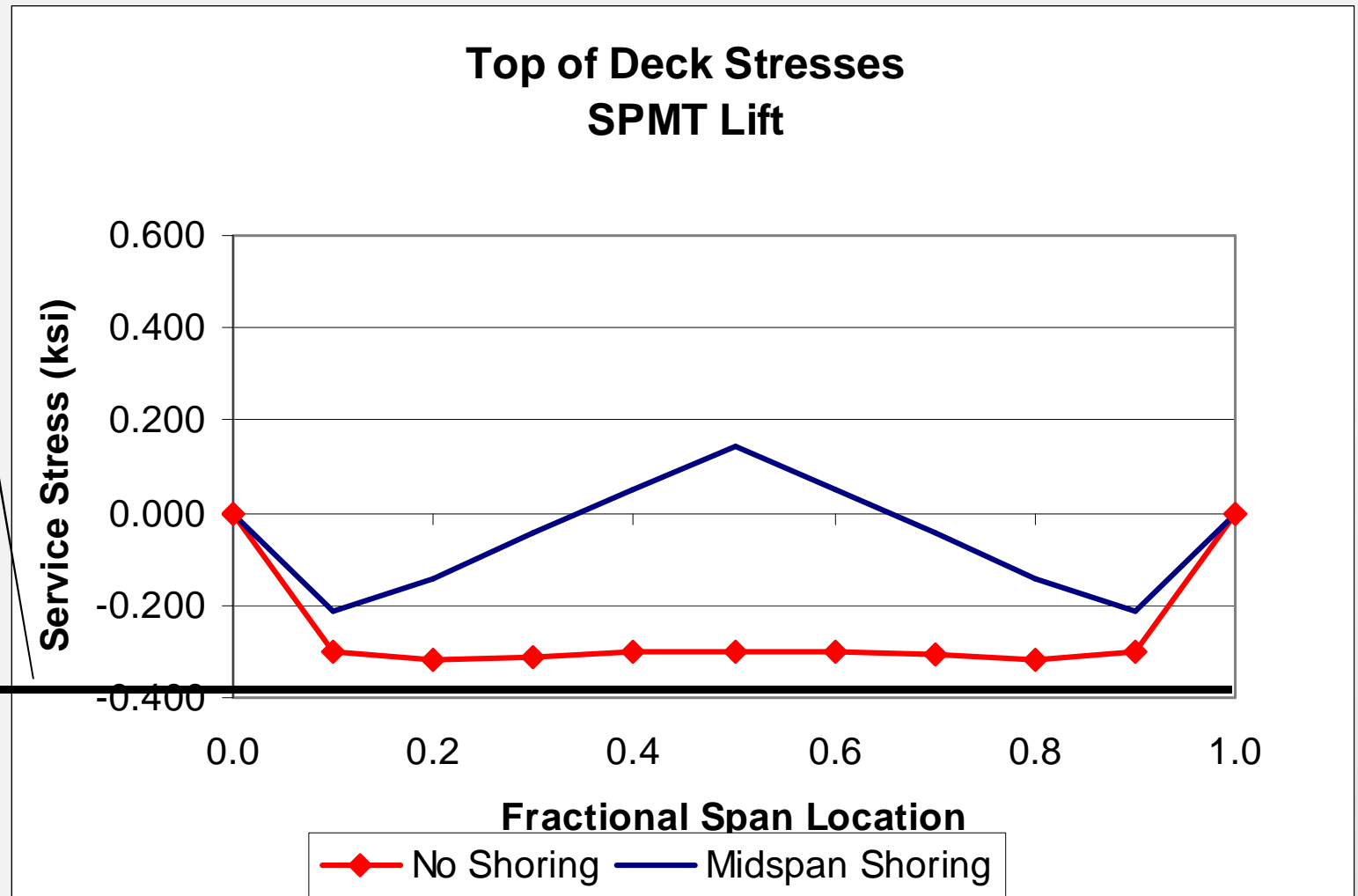
# Stress Discussion

**Top of Deck Stresses - No Temporary Shoring  
SPMT Lift**

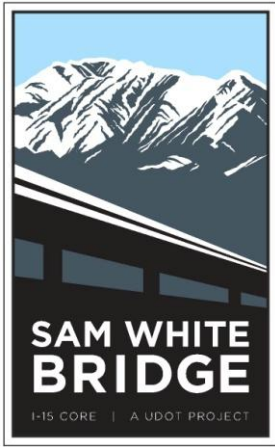




# Stress Discussion



Modulus of  
Rupture

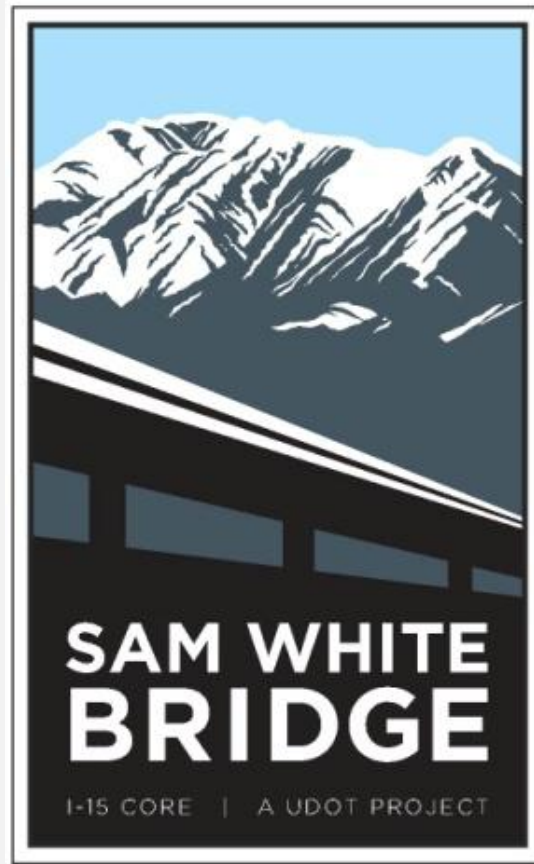


# Advantages of Design-Build

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## Demonstrates adaptability

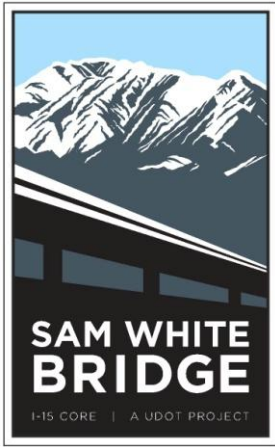
- Simple modifications yield tremendous dividends
- Structural durability improved
- Schedule flexibility (two spans, one night)



# I-15 CORE Design-Builder Perspective Provo River Constructors (PRC) 200 South and Sam White Lane

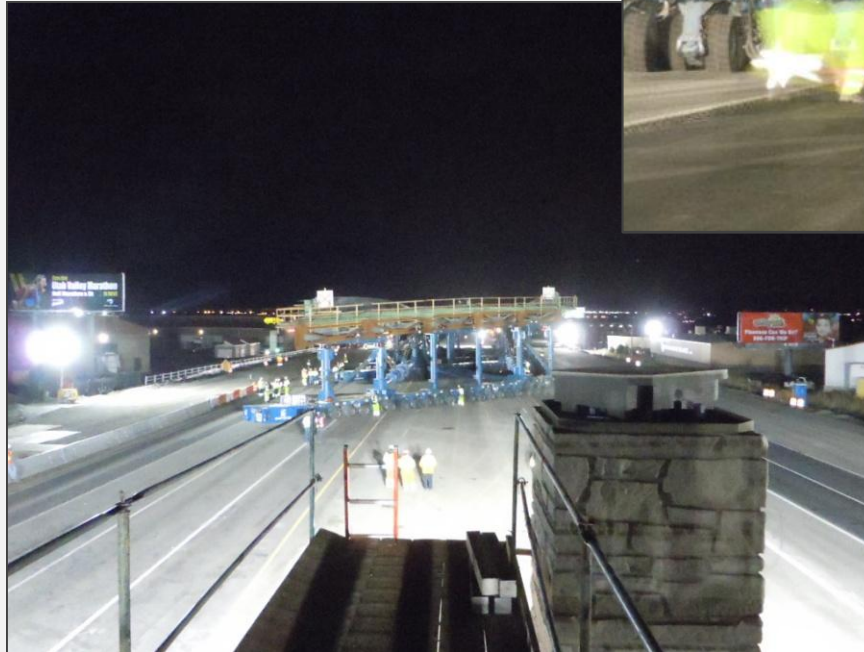
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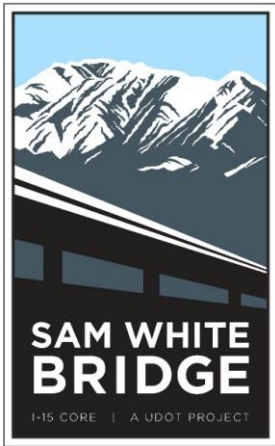
Richard Hansen, P.E.; Structures Designer



# 200 South and Sam White Lane

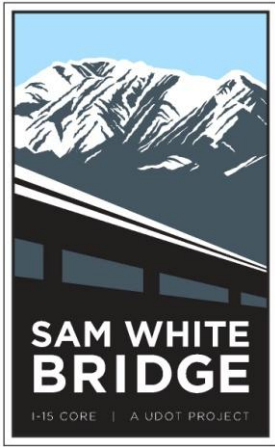
- Designer perspective
  - You want to move what?
  - Where?





# Bridge Comparison

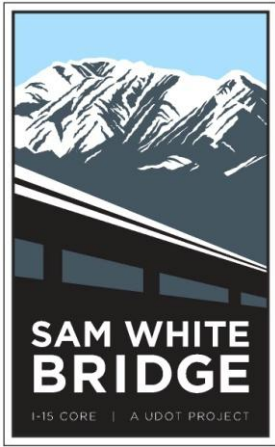
	200 South	Sam White Lane
Out-to-Out Length	325'-0"	354'-0"
Span Lengths	(2) 162.5'-0" spans	(2) 177'-0" spans
Deck Width	68'-10"	76'-10"
Superstructure Depth	5'-7"	7'-1"
Number of Girders	6 girders	6 girders
Girder Spacing	12'-6"	13'-6"
Superstructure Weight	3,300,000 lbs	4,200,000 lbs



# Design Considerations

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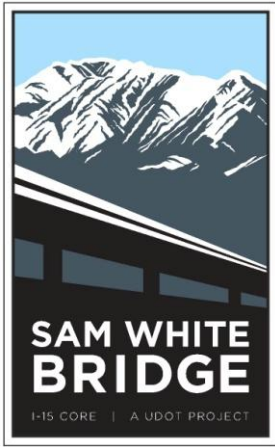
- Superstructure weight
- SPMT limits/grading
- Geometry
- Temporary supports
- Flexibility in design
- Structural modeling/tolerances/monitoring



# Superstructure Weight

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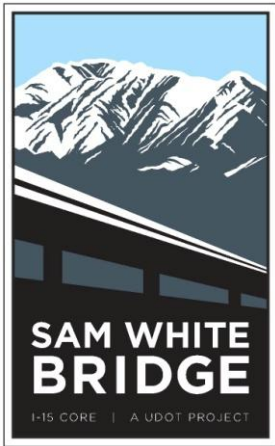
- Utilize light-weight concrete (120 pcf)
- Place sidewalk after bridge move
- Minimize seismic forces and displacements
- Minimize number of SPMTs



# SPMT Limits/Grading

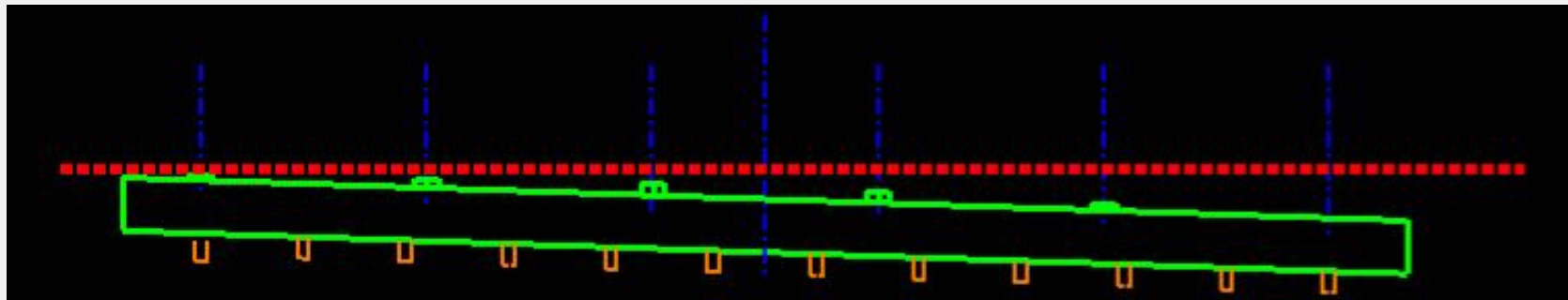
- Bridge weight
- SPMT Limits
  - 11 k/wheel
  - 22 k/axle
  - 44 k/axle line
- Stroke limits (20 inches)
- Grading
  - Use of SPMTs (feasibility )
  - Match relative elevations



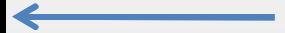


# Geometry

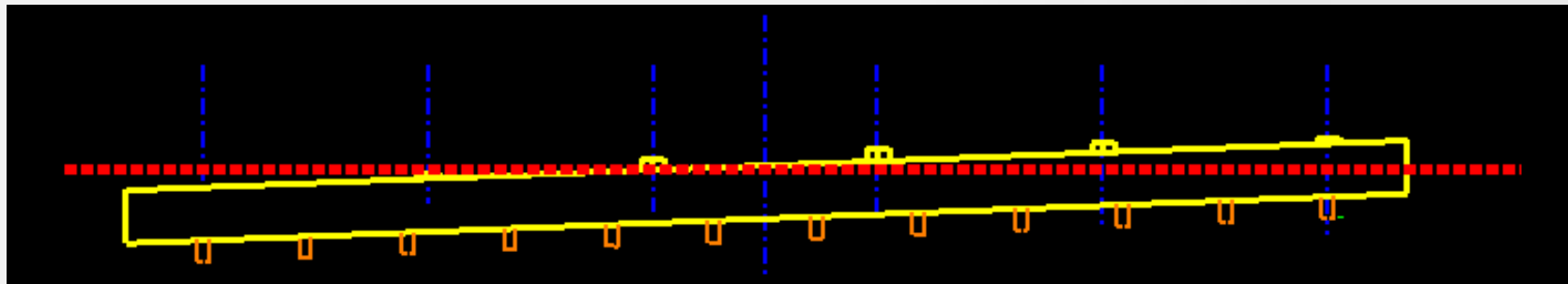
Abutment 1 (West Abutment) – Looking West



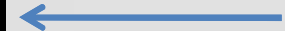
SPMT  
Travel  
Direction

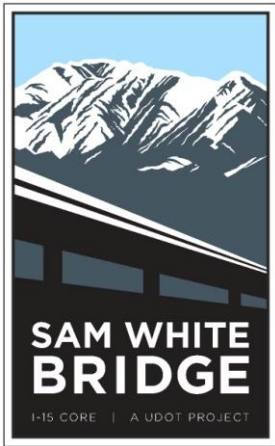


Abutment 3 (East Abutment) – Looking West



SPMT  
Travel  
Direction

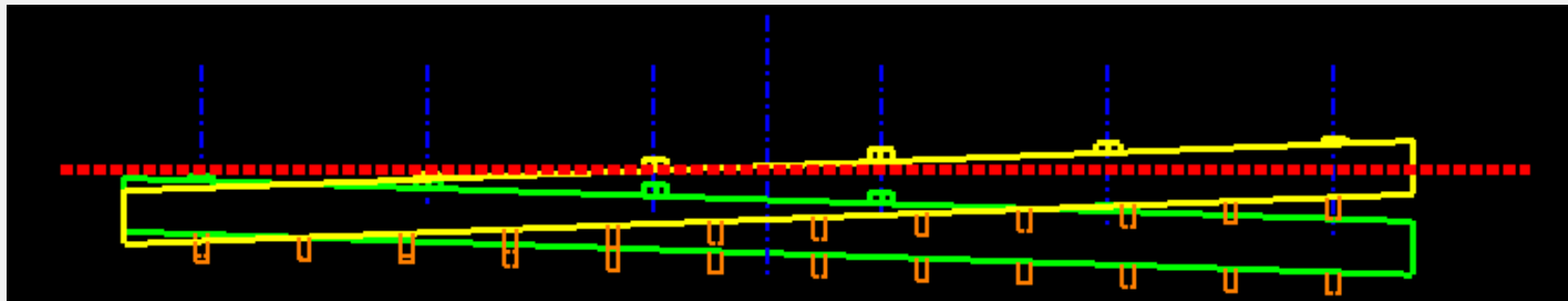




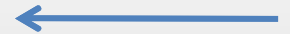
# Geometry

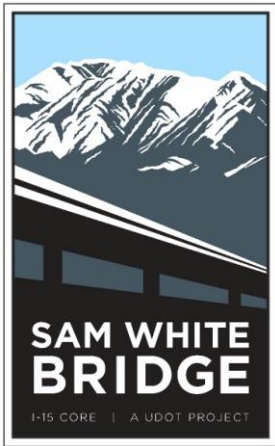
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## Superimposed Abutments – Looking West



SPMT  
Travel  
Direction

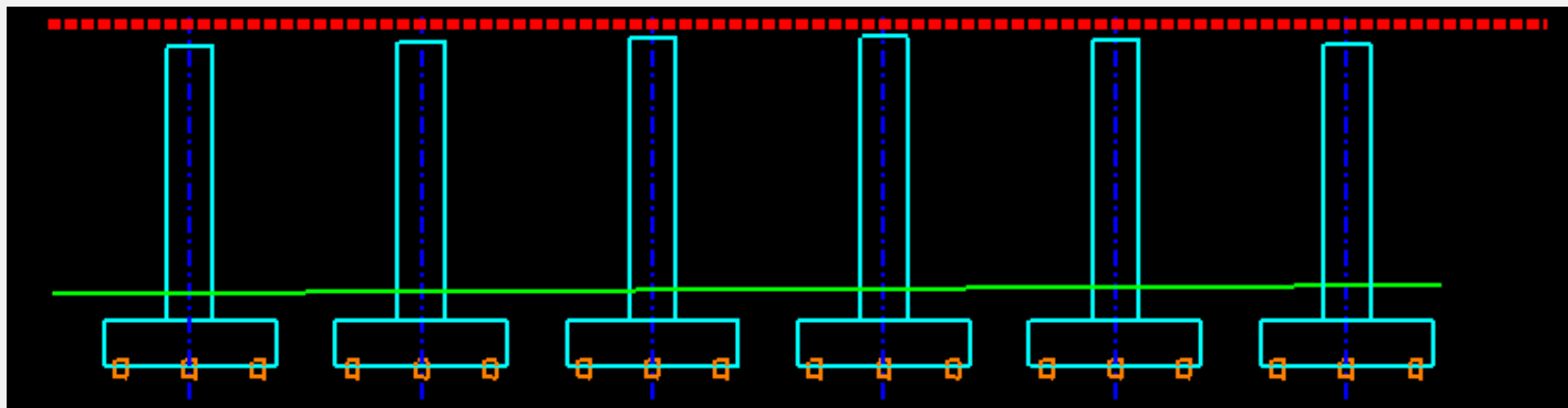




# Geometry

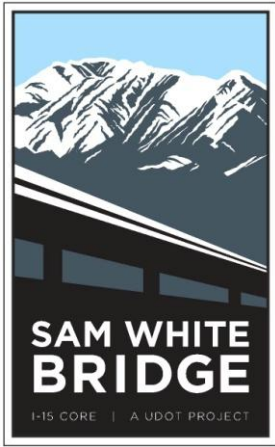
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Bent – Looking West



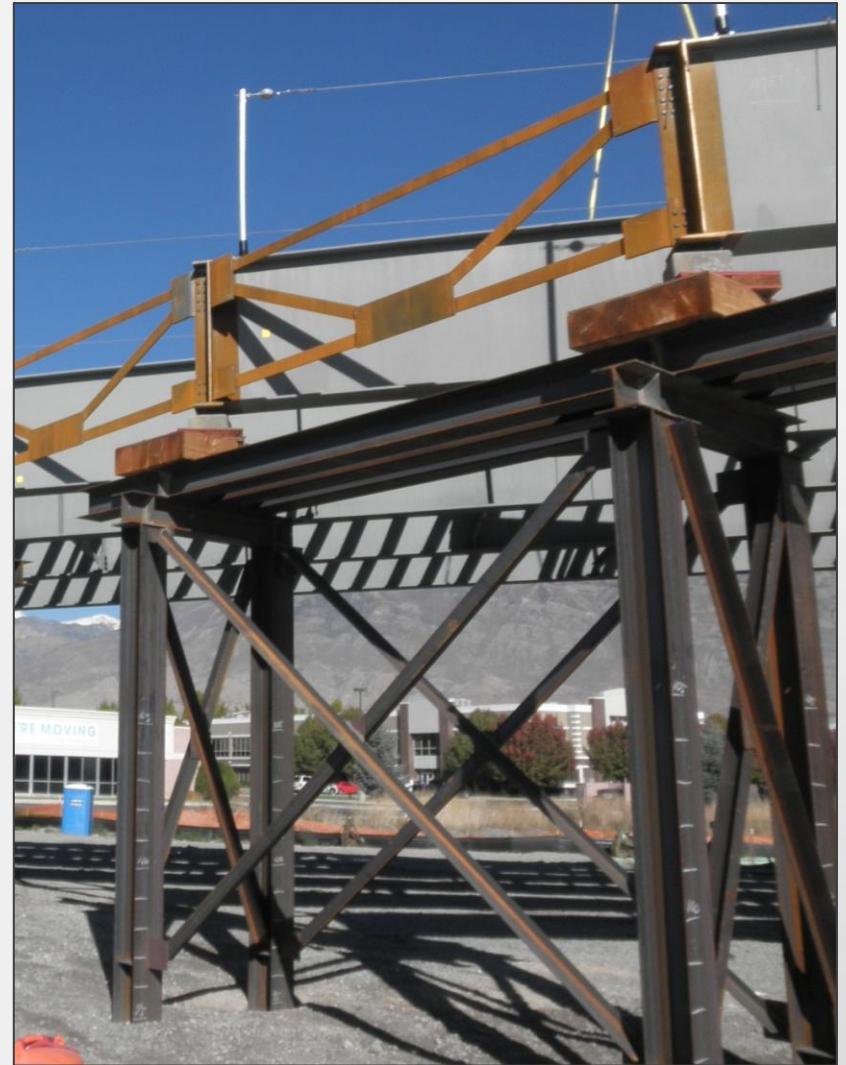
SPMT  
Travel  
Direction

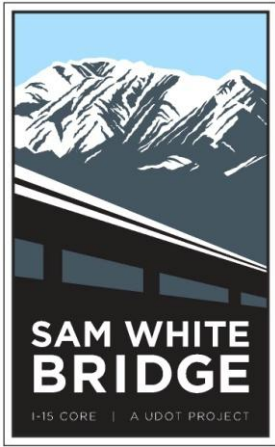




# Temporary Supports

- Significant coordination needed
- Temporary support design considerations (piles vs. spread footings)



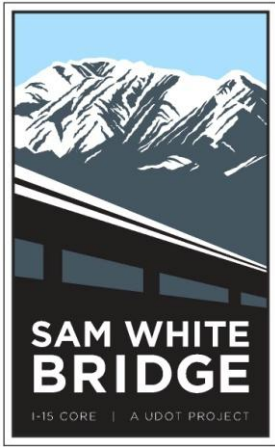


# Flexibility in Design

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- Incorrect flange plate ordered
- Cross frame fit
- Traffic control
- Travel paths
- Schedule





# Structural Modeling/Tolerances

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- Stroke required to lift
- Deck and parapet stress
- Allowable twist/deflections
- Placement tolerances

